

C2

Apprenticeship and Industry Training

Rig Technician

Apprenticeship Course Outline

5207 (2007)

Alberta



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Course Outline

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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyman or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeymen, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Rig Technician Provincial Apprenticeship Committee.

The graduate of the Rig Technician apprenticeship program is a certified journeyman who will be able to:

- take responsibility for personal safety and the safety of others.
- supervise, coach and train apprentices and floor hands.
- perform the duties of a motorhand, derrickhand or driller.
- perform assigned tasks in accordance with quality and production standards required by industry.

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level.
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade.
- promote apprenticeship programs and training and the pursuit of careers in their trade.
- make recommendations to the board about the appointment of members to their trade's PAC.
- help settle certain kinds of disagreements between apprentices and their employers.
- carry out functions assigned by their trade's PAC or the board.

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- make recommendations to the board about:
 - standards and requirements for training and certification in their trade.
 - courses and examinations in their trade.
 - apprenticeship and certification.
 - designation of trades and occupations.
 - regulations and orders under the Apprenticeship and Industry Training Act.
- monitor the activities of local apprenticeship committees in their trade.
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade.
- promote apprenticeship programs and training and the pursuit of careers in their trade.
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations.
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade.
- may participate in resolving certain disagreements between employers and employees.
- carry out functions assigned by the board.

Rig Technician PAC Members at the time of publication.

Mr. B. Jones.....	Calgary	Presiding Officer
Mr. J. Inverarity	Calgary	Employer
Mr. D. Mathers	Calgary	Employer
Mr. R. Pickering	Okotoks.....	Employer
Mr. K. Rockabar.....	Okotoks.....	Employer
Mr. N. Alexander.....	Cochrane	Employee
Mr. K. Comeau.....	Airdrie	Employee
Mr. D. Moore.....	Teulon MB	Employee
Mr. C. Zimmer.....	High River	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards.
- provide registration and counselling services to apprentices and employers.
- coordinate technical training in collaboration with training providers.
- certify apprentices and others who meet industry standards.

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment.
- providing and maintaining safety equipment, protective devices and clothing.
- enforcing safe working procedures.
- providing safeguards for machinery, equipment and tools.
- observing all accident prevention regulations.

The employee and apprentice are responsible for:

- working in accordance with the safety regulations pertaining to the job environment.
- working in such a way as not to endanger themselves, fellow employees or apprentices.

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Rig Technician apprenticeship technical training:

NAIT
Red Deer College
SAIT

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Rig Technician Provincial Apprenticeship Committee.

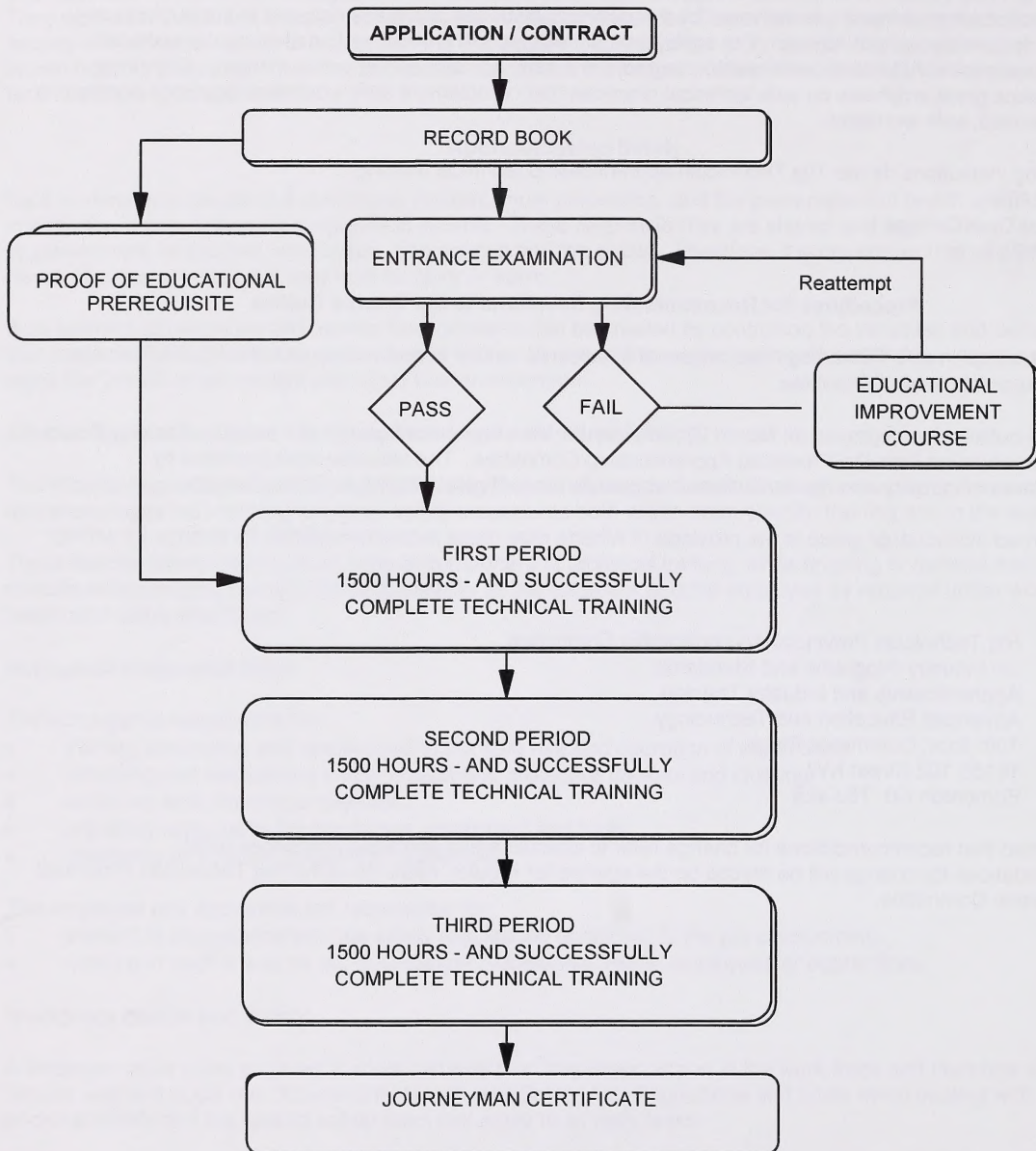
This course outline was approved on March 23, 2007 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Rig Technician Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Rig Technician Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Rig Technician Training Profile
FIRST PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)

SECTION ONE

**INDUSTRY, COMMUNICATION
AND LEADERSHIP**

15 Hours



A

Apprenticeship System

1 Hour

B

Oil and Gas Drilling Industry
and Associations

2 Hours

C

Regulations That Affect the
Trade

3 Hours

D

Communication Skills

7 Hours

E

Manuals, Forms, Logs and
Records

2 Hours

SECTION TWO

**RIG SAFETY AND SAFETY
SUPERVISION**

37 Hours



A

Rig Safety Hazards

1 Hour

B

Rig Lifting, Slip and Fall
Hazards

1 Hour

C

Blow Out Prevention
Equipment

6 Hours

D

Fall Protection and Rig
Rescue

18 Hours

E

Confined Spaces on Drilling
Rigs

5 Hours

F

Detection and Control of
Flammable Substances on
the Rig

6 Hours

SECTION THREE

**DRIVING AND LOADER
SAFETY**

12 Hours



A

Light Duty Vehicle Driving
Improvement

8 Hours

B

Safe Loader Operation

4 Hours

SECTION FOUR

**TOOLS, EQUIPMENT AND
RIGGING**

25 Hours



A

Proper Care and Use of
Hand Tools

1 Hour

B

Proper Care and Use of
Power Tools

2 Hours

C

Rigging

10 Hours

D

Slip and Cut

1 Hour

E

Rig Move Awareness

2 Hours

F

Introduction to Drilling
Fluids

1 Hour

G

Storage and Inventory

1 Hour

H

Tubulars

4 Hours

I

Drawworks

2 Hours

J

LPG Fittings

1 Hour

SECTION FIVE

POWER SYSTEMS

31 Hours



A Fuel Supply Systems 1 Hour	B Engines 4 Hours	C Drivelines and Transmissions 4 Hours
D Cooling Systems 2 Hours	E Lubrication Systems 2 Hours	F Service Schedules 2 Hours
G Electrical Systems 7 Hours	H Air Compressors and Brake Systems 2 Hours	I Introduction to Boilers 2 Hours
J Hydraulic Systems 3 Hours	K Pipes, Hoses and Connections 2 Hours	

SECOND PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)

SECTION ONE

**COMMUNICATION,
LEADERSHIP AND
SUPERVISION**
31 Hours



A

Leadership
6 Hours

B

Communication
6 Hours

C

**Safe Practice and Safety
Supervision**
3 Hours

D

Response To Rig Injuries
16 Hours

SECTION TWO

DRILLING FLUIDS
47 Hours



A

Geology and Lithology
3 Hours

B

Mud
16 Hours

C

Pumps
10 Hours

D

**High Pressure Mud Lines,
Hoses and Connections**
8 Hours

E

**Mud Tank and Low Pressure
System**
6 Hours

F

Casing
1 Hour

G

**Waste Management and
Spill Response**
3 Hours

SECTION THREE

**FIRST LINE BLOWOUT
PROTECTION**
30 Hours



A

First Line Blowout Prevention
30 Hours

SECTION FOUR

DERRICK OPERATION
12 Hours



A

Derrick Equipment
3 Hours

B

Derrick Safety
2 Hours

C

Rig Up and Rig Down
2 Hours

D

Tripping
5 Hours

THIRD PERIOD
(4 Weeks 30 Hours per Week – Total of 120 Hours)

SECTION ONE

**LEADERSHIP AND
COMMUNICATION**
14 Hours



A

Written Reports and Forms
3 Hours

B

Managing People
11 Hours

SECTION TWO

**RIG MANAGEMENT AND
SAFETY**
42 Hours



A

Safety Management
4 Hours

B

Second Line Well Control
30 Hours

C

Incident Investigation and
Loss Control
8 Hours

SECTION THREE

RIG OPERATIONS
34 Hours



A

Rig Boilers
16 Hours

B

Console
8 Hours

C

Drilling Calculations
6 Hours

D

Drawworks
2 Hours

E

Managing Rig Moves
2 Hours

SECTION FOUR

DRILLING OPERATIONS
30 Hours



A

Operating Floor Equipment
5 Hours

B

Drilling Tools
4 Hours

C

Tubulars
8 Hours

D

Drilling
10 Hours

E

Casing
3 Hours

NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

**FIRST PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... INDUSTRY, COMMUNICATION AND LEADERSHIP 15 HOURS

A. Apprenticeship System1 Hour

Outcome: *Explain the role and purpose of the advisory network and Provincial Apprenticeship Committee structure for the Rig Technician trade.*

1. State the process involving the contract of apprenticeship and record book.
2. Outline the training profile for the rig technician trade.
3. Describe the structure and purpose of provincial and local apprenticeship committees.

B. Oil and Gas Well Drilling Industry and Associations2 Hours

Outcome: *Explain the role of the industry and identify the associations and whom they represent.*

1. Describe this industry as it applies to Western Canada.
2. Describe the scope of training education opportunities.
3. Briefly describe the industry associations involved with oil and gas well drilling:
 - a) CAODC
 - b) CAPP, PSAC, SEPAC, etc.
 - c) Canadian Petroleum Safety Council (CPSC)

C. Regulations That Affect the Trade3 Hours

Outcome: *Identify the regulatory bodies that apply to drilling oil wells.*

1. Explain the role of the provincial regulators of oil and gas well drilling.
2. Briefly explain the role of the employer and the employee in regard to the following regulations:
 - a) provincial worker safety regulation
 - b) WHMIS regulations
 - c) fire regulations
 - d) provincial workers compensation regulations
 - e) highway and transportation regulations pertaining to drilling equipment and rig crews

D. Communication Skills7 Hours

Outcome: *Communicate effectively when giving or receiving instructions.*

1. Identify and describe the 'chain of command' or organizational structure of the drilling rig, including:
 - a) staff at the rig site employed by the drilling contractor
 - b) staff at the rig site employed by the lease holder
 - c) subcontractors on the rig employed by the drilling contractor
 - d) subcontractors on the rig employed by the leaseholder
2. Describe the essential differences in communicating with fellow workers, supervisors, customers and subcontractors on a rig.

3. Supervise and train junior workers:
 - a) organize and plan on the job training and instruction
 - b) obtain feedback on training and instruction
 - c) evaluate training and instruction
4. Resolve communication problems.
5. Describe anger management.
6. Describe communication styles.
7. Interpret non verbal communication.
8. Obtain feedback on communication initiated; give feedback on the other person's communication.
9. Practice positive community relations:
 - a) show respect for the landowner
 - b) show respect for members of the local community

E. Manuals, Forms, Logs and Records.....2 Hours

Outcome: *Complete forms and maintain records. Use manuals to access information.*

1. Identify forms used on drilling rigs.
2. Identify the information required to complete a form.
3. Complete all required forms in a legible manner.
4. Maintain forms, logs and inventory in a systematic organized way.
5. Describe the use of standard manuals used on a drilling rig, including:
 - a) Driller's manual
 - b) Safety manual
 - c) Rig Move manual

SECTION TWO: RIG SAFETY AND SAFETY SUPERVISION37 HOURS

A. Rig Safety Hazards1 Hour

Outcome: *Recognize safety hazards present in the worksite and take actions to protect self and others.*

1. Describe the types of personal hazards associated with the work assigned to a rig technician, including:
 - a) tools
 - b) rotating machinery
 - c) compressed air
 - d) jacking and hoisting
 - e) exhaust gases
 - f) boilers
 - g) steam
 - h) high pressure fluids
 - i) noise
 - j) other
2. Describe what a lockout is and when or where lockouts should be used.
3. Identify the safety equipment and procedures used for dealing with hazards associated with rig operations.

4. Practice safe care and control of the hazardous products commonly used by rig technicians.
5. Recognize and describe environmental hazards associated with drilling operations.
6. Describe fire control:
 - a) fire types
 - b) extinguisher types
7. Describe fire equipment maintenance procedures.
8. Describe rig emergency response procedure.
9. Participate/conduct safety training for new hands.
10. Participate in preparing a written job safety analysis (JSA).

B. Rig Lifting, Slip and Fall Hazards1 Hour

Outcome: *Identify lifting slip and fall hazards and describe how to prevent them.*

1. Be able to demonstrate proper body position for lifting.
2. Explain the hazards and corrective action for walking and carrying items on slippery deck plates, stairs etc.
3. Monitor floorhands and other workers for:
 - a) correct lifting techniques
 - b) suitability of non slip footwear
 - c) appropriate personal protective equipment for tasks performed

C. Blow Out Prevention Equipment6 Hours

Outcome: *Give an overview of blow out prevention and describe the role of the motorhand in blow out prevention.*

1. Describe the need for blow out prevention and how Blow Out Preventers (BOP) work.
2. Describe BOP components and their functions:
 - a) stabbing valve
 - b) accumulator
 - c) blind ram, pipe ram, annular preventer
 - d) kill line
 - e) degasser
 - f) choke manifold
 - g) HRC
3. Explain Maximum Allowable Casing Pressure (MACP).
4. Describe the operation of the BOP accumulator.
5. Describe the Nitrogen Back Up system and AEUB pressure requirements.
6. Describe remote panel.
7. Describe nipping up procedures:
 - a) rigging the BOP stack
 - b) inspecting and cleaning ring gaskets and grooves
 - c) the purpose of applying torque using a star pattern
8. Describe the kick/kill procedure for the motorhand.

D. Fall Protection and Rig Rescue18 Hours***Outcome: Use fall protection systems. Be able to perform fall rescue.***

1. Calculate the force generated by a fall, given weight and length of drop.
2. Identify situations where fall protection systems are required.
3. Describe selection, application, components and hazards of passive and active fall protection systems:
 - a) primary and secondary attachments
 - b) travel restraint
 - c) work positioning
 - d) vertical and horizontal fall arrest
 - e) certified and non certified attachment points
 - f) selection of attachment points
 - g) swing fall
4. Describe ropes and knots used for fall protection and rescue:
 - a) taglines
 - b) Munter hitch
 - c) figure eight knot
 - d) calculate tensile strength requirements for taglines, etc.
5. Describe shock absorbers, application and hazards of not using them.
6. Identify the components for vertical and horizontal lifelines.
7. Describe permanent and temporary cable ladder systems.
8. Demonstrate equipment inspection before and after use.
9. Demonstrate the procedure for correctly fitting a harness.
10. Demonstrate the use of the double leg lanyard while climbing.
11. Demonstrate the use of lifelines.
12. Demonstrate work position from a ladder.
13. Describe recovery team roles:
 - a) team safety comes first
 - b) identify team
 - c) identify action, who takes charge
14. Describe rescue equipment and how it is used:
 - a) block and tackle
 - b) stretcher – stretcher board
 - c) four point lifting harness
15. Describe the management of an escape device.
16. Describe rescue – recovery scenarios:
 - a) securing victim
 - b) block and tackle lift from monkey board
17. Perform a ladder rescue lift and lower.
18. Perform a casualty pick.

E. Confined Spaces on Drilling Rigs5 Hours***Outcome: Follow appropriate procedures for working in confined spaces.***

1. Define what is meant by confined space and give examples of confined space areas on a drilling rig.
2. Identify potential fatal hazards in confined space entry:
 - a) entering without testing
 - b) lack of retesting
 - c) not blanking or locking out
 - d) lack of ventilation
 - e) inert gases
 - f) use of oxygen
 - g) cutting/welding hoses and valves
 - h) welding without checking neighboring compartments
 - i) sludge in confined space
 - j) lack of respiratory protection
 - k) possible toxic or flammable material
 - l) improper rescue procedures
3. Locate and identify legislation and regulations pertinent to "confined space entry":
 - a) legal definition of confined space (regulations)
 - b) employer's responsibilities
 - c) employee's responsibilities
 - d) code of practice for entry and work in confined spaces
 - e) safety training
4. Describe the following hazards in confined space entry:
 - a) enclosed spaces
 - b) partially enclosed spaces
 - c) natural ventilation
 - d) oxygen deficiency
 - e) explosive and toxic liquids and gases
 - f) hydrogen sulphide
 - g) carbon monoxide liquid materials
 - h) decaying organic matter in confined space
 - i) fire triangle
 - j) upper and lower explosive limits
5. Describe steps to safely enter confined space.
6. Describe atmospheric testing and monitoring procedures.
7. Prepare safety equipment and clothing.
8. Describe role of ground fault interrupters.
9. Describe the function of explosion proof lighting.
10. Describe how to perform a safe rescue.
11. List rescue equipment.

F. Detection and Control of Flammable Substances on the Rig6 Hours

Outcome: *Be able to detect the presence of flammable substances and take appropriate action. Describe the classification and properties of flammable substances.*

1. Describe what is meant by upper and lower explosive limit (UEL, LEL) and target work range.
2. Describe the implications of a vapour density or specific gravity for flammables that is less than or greater than one.
3. Describe gas and vapour detection equipment:
 - a) active
 - b) passive
 - c) fixed and personal monitors
4. Describe the hazards of hydrogen sulphide.
5. Describe the seven steps for dealing with a hydrogen sulphide incident.
6. Describe the operation of a flame arrestor.
7. Describe factors that will affect the operation of detection equipment:
 - a) moisture
 - b) very high concentrations of combustible gas
 - c) dust
 - d) catalytic sensor poisons
 - e) radio frequency interference
8. Describe monitor function testing and the need to calibrate monitors for a specific flammable substance.
9. Describe sampling strategies and their appropriate application:
 - a) qualitative vs. quantitative assessment
 - b) intermittent
 - c) continuous
 - d) grid strategy
 - e) spoke and wheel strategy
10. Compare, contrast and rank control methods for combustible gases:
 - a) engineering controls
 - b) administrative controls
 - c) pipe controls
11. Describe the obligation to refuse unsafe work.

SECTION THREE: DRIVING AND LOADER SAFETY 12 HOURS**A. Light Duty Vehicle Driving Improvement.....8 Hours**

Outcome: *Will drive more carefully and responsibly and exhibit awareness of the unique hazards of driving to and from drilling rigs.*

1. Describe the worker's responsibility for ensuring that equipment is operated safely.
2. Describe the importance of using seatbelts.
3. Describe driving in marginal traction.
4. Describe emergency equipment and supplies required for travelling in remote locations.
5. Describe the hazards of driving on rural roads.

6. Describe the causes and effect of impairment on driving.
7. List the factors that can impair the ability to drive or operate equipment:
 - a) drugs
 - b) alcohol
 - c) fatigue
 - d) distractions (e.g. cell phones, driving an unfamiliar vehicle)
8. Describe securing loads for light trucks.
9. Describe tire chain installation.
10. Use a map to determine the best route to any road accessible destination in Western Canada.
11. Describe the requirements of the Transportation of Dangerous Goods (TTDG) legislation as it applies to drilling rigs.
12. List the common products used on drilling rigs covered by provincial transportation of dangerous goods legislation.
13. Describe off road driving techniques.

B. Safe Loader Operation.....4 Hours

Outcome: *Describe safe loader operation at rig site and in the shop or yard.*

1. Describe loaders used by rig crews:
 - a) equipment used on lease sites
 - b) yard equipment
2. Describe forklift, mobile crane, and loader design principles and capacities:
 - a) types of tires
 - b) suitable applications
 - c) lift accessories
 - d) how capacity is determined
 - e) rated capacity vs. load angle and height
 - f) effects of extreme cold

SECTION FOUR: TOOLS, EQUIPMENT AND RIGGING25 HOURS

A. Proper Care and Use of Hand Tools.....1 Hour

Outcome: *Describe proper hand tool usage on a drilling rig.*

1. Recognize the safe and serviceable condition of hand tools.
2. Describe the need for securing or containing hand tools, fasteners and loose parts for:
 - a) working at heights
 - b) in the vicinity of an open hole, etc.
3. Identify and use proper wrench sizing (Metric and SAE).
4. Identify and the describe the use of hand tools:
 - a) socket sets
 - b) combination wrenches
 - c) types of screwdrivers
 - d) types of pliers
 - e) pipe wrenches
 - f) chain wrench

5. Apply and use measuring principles and tools:
 - a) calipers
 - b) torque wrench, hydraulic torque wrench
 - c) thread gauges
 - d) metric rules, scales and gauges used to measure volume, temperature and pressure

B. Proper Care and Use of Power Tools2 Hours

Outcome: Identify and use power tools common to the trade.

1. Describe the safe handling of power tools and their use on the rig:
 - a) drills
 - b) grinders
 - c) saws
2. Describe the importance of electrical grounding.
3. Describe the relationship between cord size (gage), length of extension cord and voltage.
4. Describe the safe set up and operation of the wash gun.
5. Describe air powered hand tools:
 - a) impact tools
 - b) grinders
6. Describe operation and safe handling of hydraulic tubular tools, (e.g. pipe spinners, Iron Roughneck Hawkjaw etc.) pinch points and lockouts.
7. Summarize general maintenance requirements for hydraulic tubular tools.

C. Rigging10 Hours

Outcome: Describe rigging and hoisting equipment and procedures; use correct hand signals.

1. Describe the construction of wire rope.
2. Describe the construction and use of steel and fiber slings.
3. Describe hoisting equipment hardware.
4. Describe construction and use of chain and chain slings.
5. Describe the construction of fiber rope.
6. Describe knots and their application.
7. Describe the effect of knot types on rope strength.
8. Describe inspection of clamps, rope, slings.
9. Determine the weight of various objects from specifications (e.g. rig manual).
10. Select appropriate rigging and slinging for weight and type of object.
11. Describe hand-rigging equipment.
12. Use standard hand signals used for rigging and hoisting operations.
13. Describe hoisting and load moving procedures.

D. Slip and Cut.....1 Hour**Outcome: Basic awareness of the purpose of the slip and cut operation.**

1. Describe purpose of slip and cut.
2. Identify wear, condition of:
 - a) lines
 - b) drum
 - c) drum anchor
 - d) sheaves
 - e) anchor bolt, dead man
 - f) hanging blocks crown blocks
3. Describe abnormal line wear.
4. Describe protective safety equipment requirements for slip and cut procedures.

E. Rig Move Awareness2 Hours**Outcome: Describe the hazards associated with rig set up and tear down.**

1. Describe the role of the motorhand in rig moves.
2. Describe potential hazards that exist when moving a rig.
3. Describe safe prefab installation.
4. Describe storage and winterizing considerations.

F. Introduction to Drilling Fluids1 Hour**Outcome: Describe purpose, composition and classes of drilling fluids.**

1. Describe the composition of drilling fluids:
 - a) water based
 - b) oil based
 - c) air drilling
2. Describe the purpose of drilling fluids.
3. Describe the safe storage and handling of drilling fluid ingredients.
4. Describe PPE requirements for handling drilling fluids or ingredients.

G. Storage and Inventory1 Hour**Outcome: Describe the importance of maintaining inventoried and stocked items.**

1. Describe the importance of maintaining adequate supplies in usable condition.
2. Describe loss control methods.
3. Describe classification systems:
 - a) by product category
 - b) by manufacturer
4. Implement procedures to keep track of inventory and usage.
5. Describe the "want list".
6. Implement strategy for the timely replacement of inventory.

7. Describe the importance of maintaining an appropriate inventory based on item usage and anticipated requirement.
8. Describe techniques for fixing discrepancies in stock levels.
9. Describe appropriate storage procedure for items that are subject to be damage in storage.

H. Tubulars4 Hours

Outcome: *Describe care of tubulars; be able to identify thread types.*

1. Describe tubular thread compounds and applications.
2. Identify tubular thread types.
3. Describe drifting casing.
4. Describe the function of the upper and lower Kellycock.
5. Identify the use and correct application for:
 - a) collars
 - b) protectors
 - c) pick up subs
 - d) slings
 - e) nubbins
6. Describe proper positioning of holdback line.
7. Describe proper operation and condition of spinning chain.
8. Describe operation of casing tongs.
9. Identify casing tong pinch points.

I. Drawworks2 Hours

Outcome: *Understands how to perform basic maintenance on the drawworks under the driller's direction.*

1. Describe the function and operation of:
 - a) blocks
 - b) drum
 - c) main brakes
 - d) auxiliary brakes
 - e) brake linkage
2. Describe drawworks lock outs.
3. Describe drawworks lubrication procedure.

J. LPG Fittings1 Hour

Outcome: *Describe storing and handling LPG containers and hooking up and operating LPG fired equipment.*

1. Describe the safe operation of propane fired equipment including:
 - a) products of combustion
 - b) fire or explosion hazards
 - c) ensuring adequate venting – ventilation

2. Describe liquid petroleum gas (LPG) containers:
 - a) tanks – types tank certification
 - b) filling
 - c) storage
 - d) tank transportation, including TDG requirements
 - e) on site tank placement requirements
 - f) temperature of vaporization
3. Describe LPG lines and fittings:
 - a) connect – disconnect
 - b) threaded connectors
 - c) materials used for gas lines - fittings
 - d) considerations for running LPG lines on site
 - e) testing connectors
4. Describe the function and purpose of LPG regulators.
5. Describe the purpose of the safety pilot light.
6. Describe how to light a safety pilot light.

SECTION FIVE:.....POWER SYSTEMS.....31 HOURS

A. Fuel Supply Systems1 Hour

Outcome: Perform basic maintenance and service on a fuel supply system.

1. Identify the fuels used to power motor vehicles and drilling rigs and the precautions for their use and storage:
 - a) gasoline
 - b) diesel
2. Identify the major fuel supply system components.
3. Describe the operation of a fuel supply system:
 - a) fuel lines
 - b) fuel pumps
 - c) injectors
 - d) filtration
 - e) fuel tanks – fuel storage
4. Describe the legislated regulated requirements for recovery of fuel during a disassembly process.

B. Engines.....4 Hours

Outcome: Explain how to perform basic maintenance, service and minor repairs for rig engines.

1. Identify the common types (designs) of engines:
 - a) diesel and gasoline
 - b) two cycle and four cycle (diesel and gasoline)
 - c) air and liquid cooled
 - d) number and arrangement of cylinders
2. Describe inspection and daily maintenance requirements for each type of internal combustion engine.
3. Describe how to lockout the engine.

4. Describe inspection and servicing of the following:
 - a) air filters
 - b) turbo chargers
 - c) fuel filters
5. Describe the preparations required for performing routine maintenance, such as:
 - a) ensuring that replacement parts are available before starting a procedure
 - b) ensuring the proper tools are available
 - c) checking tools for condition and size, etc.
6. Describe how engines are prepared for a move or an extended shut down.

C. Drivelines and Transmissions4 Hours

Outcome: Describe operation and maintenance of rig mechanical power transmission.

1. Describe safety considerations for working with rotating equipment and guards for rotating equipment.
2. Describe maintenance of drive shafts and universal joints.
3. Describe torque tubes.
4. Describe chain and belt drive alignment and adjustment.
5. Describe operation of clutches and torque converters.
6. Describe maintenance requirements of transmissions and rotary gearbox.

D. Cooling Systems2 Hours

Outcome: Perform maintenance and servicing on a cooling system.

1. Explain the differences in operating principles between air and liquid cooling systems.
2. Identify the major components of cooling systems:
 - a) radiator
 - b) thermostats
 - c) radiator caps
 - d) pumps
 - e) fins and deflectors
 - f) shutters
 - g) filters (air and coolant)
 - h) thermatic fans (reversible)
 - i) fan hubs, clutches
 - j) shutdown devices
 - k) oil coolers and heat exchangers
3. Describe the recovery of the coolant prior to disassembly of a system:
 - a) components and proportion
 - b) handling and storage
 - c) testing methods and interpretation
 - d) inhibitors
4. Describe the removal and replacement of the components and coolant of a cooling system.

5. Describe routine service methods:
 - a) adjustments
 - b) servicing an overheated system
 - c) fan hub and clutch maintenance
 - d) correcting leaks (internal and external)

E. Lubrication Systems2 Hours

Outcome: Perform maintenance and routine servicing of lubrication systems.

1. Describe the types and classification of oil and grease:
 - a) types and grades
 - b) handling and storage
 - c) loading grease guns
 - d) lubrication and greasing schedules
 - e) precautions for adding oil
 - f) check all filler and drain plugs before operating
2. Describe oil filter systems:
 - a) types
 - b) operational principles of full flow and bypass systems
3. Analyze oil for:
 - a) oil condition
 - b) presence of moisture
 - c) leaks
 - d) other foreign substances
4. Explain the reason for oil coolers and heat exchangers.
5. Describe the effect of extreme cold on lubricants and coolants.

F. Service Schedules2 Hours

Outcome: Follow a maintenance schedule.

1. Interpret maintenance schedule according to hour meter and drilling conditions.
2. Explain conditions that are apparent due to telltales:
 - a) heavy white exhaust
 - b) heavy black exhaust
 - c) excessive blue exhaust
 - d) rough running
 - e) bearing noise
 - f) excessive vibration
 - g) leaks
 - h) overheating

G. Electrical Systems.....7 Hours

Outcome: Setup, operate and perform basic servicing of rig electrical systems.

1. Describe electrical lockouts.
2. Describe a basic electrical circuit, including:
 - a) complete circuit
 - b) AC and DC
 - c) open
 - d) short
 - e) switches
 - f) circuit protection
3. Describe potential electrical hazards.
4. Describe OH&S requirements for working with electrical systems on drilling rigs.
5. List precautions for avoiding electrical hazards.
6. Describe static electricity as it applies to drilling including:
 - a) how static electricity is formed on drilling rigs materials (plastic pipe, containers)
 - b) hazards associated with static electricity on drilling rigs (fires, etc.)
 - c) corrective action (grounding, etc.)
7. Recognize basic electrical terms and symbols.
8. Identify those electrical/electronic systems most commonly serviced by rig technicians:
 - a) lighting circuits
 - b) power accessories
 - c) outlets, fixtures and plug types as found on a drilling rig
 - d) ground rods, ground circuits, rig grounding procedure
9. Describe the procedure for replacing the electrical plug types used on a drilling rig, including selecting the correct plug for the voltage and amperage of the circuit.
10. Describe electrical generators (or alternators) and electrical power generation.
11. Describe the types of electric motors found on drilling rigs.
12. Monitor the power panel.
13. Describe the indicators of problems with motors and generators:
 - a) excessive vibration
 - b) excessive heat
 - c) unusual noises
14. Describe the maintenance of electric motors and generators.
15. Explain the purpose, operation and ratings of batteries.
16. Describe testing and routine service for batteries.
17. Diagnose problems attributed to batteries.
18. Describe the proper procedure for boosting and charging batteries in the field.
19. Define the limits of maintenance, repair or installation for electrical systems for rig technicians.

H. Air Compressors and Brake Systems.....2 Hours**Outcome: Operate, adjust and service compressed air systems.**

1. Identify and describe the purpose of the major air system components:
 - a) compressors
 - b) air dryers
 - c) receivers (tanks)
 - d) filters
 - e) regulators
 - f) valves and governors
 - g) plumbing & piping
 - h) belts or couplings
 - i) electric motor & controls
2. Describe the daily, routine maintenance requirements for air compressors:
 - a) lubrication
 - b) heat exchanger condition – temperatures
 - c) pressure valve checks (ABSA requirements)
 - d) condensate check – removal
3. Describe ABSA requirements for periodic inspection and certification requirements for air receivers (air tanks).
4. Describe the inspection process to identify damaged or worn components.
5. Describe the typical braking systems used for rotating equipment on a drilling rig.
6. Describe brake components.
7. Verify brake system operation.
8. Inspect air system components.
9. Perform routine maintenance on brake systems.

I. Introduction to Boilers.....2 Hours**Outcome: Monitor rig boiler; identify normal from abnormal operation.**

1. Describe rig boiler system.
2. Describe lockouts for boiler and steam systems.
3. Describe the hazards and precautions required for working with boilers and steam.
4. Describe the precautions needed for handling de-scaling chemicals.
5. Describe daily boiler inspection and daily maintenance.
6. Describe boiler instrumentation and controls:
 - a) pressure gauge
 - b) water level gauge glass and column
 - c) water level controls
 - d) automatic low water fuel cutoff device
 - e) on-off pressure control/modulating control
 - f) high-pressure steam fuel cutoff control
 - g) flame failure / ignition / start-up system
 - h) safety valve
 - i) firing controls

J. Hydraulic Systems3 Hours

Outcome: *Describe and perform routine maintain on the hydraulic systems on a drilling rig.*

1. Explain hydraulic principles:
 - a) incompressibility of fluids
 - b) multiplication of force
2. Identify pinch points and the use of lockouts for hydraulic components.
3. Describe the role of a motorhand in ensuring floorhands and other workers watch for pinch points and use lockouts.
4. Identify rig hydraulic system layout.
5. Identify rig hydraulic system components, their function and how to recognize problems:
 - a) pumps
 - b) cylinders and pistons
 - c) motors
 - d) rotary table
 - e) lines and fittings
 - f) tuggers
 - g) survey units
 - h) top drives
6. Identify the hydraulic fluids commonly used on drilling rigs.
7. Analyze the condition of hydraulic fluid.
8. Perform an inspection on hydraulic components, fittings and lines.
9. Describe how to find and identify hydraulic leaks, or any other problems requiring attention.

K. Pipes, Hoses and Connections2 Hours

Outcome: *Explain pipe and hose pressure schedules as found on drilling rigs.*

1. Describe low, and high pressure connectors and fittings used for air, hydraulics, steam, coolant, fuel, drilling fluid (high pressure and low pressure sides) as found on drilling rigs:
 - a) valves
 - b) tees
 - c) threaded pipe
 - d) unions
 - e) nipples
 - f) collars
 - g) reducers
 - h) flanges
 - i) gaskets – o rings
 - j) air unions – air bags
 - k) reducer (swedge)
 - l) grooved connections
 - m) flanges
2. Explain appropriate application of fittings and connectors:
 - a) valves
 - b) tees
 - c) threaded pipe
 - d) unions

- e) nipples
- f) collars
- g) reducers
- h) flanges
- i) gaskets – o rings
- j) air unions – air bags
- k) reducer (swedge)
- l) grooved connections
- m) flanges

**SECOND PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....COMMUNICATION, LEADERSHIP AND SUPERVISION..... 31 HOURS

A. Leadership.....6 Hours

Outcome: Assist or act for the driller as crew leader.

1. Describe the role of supervisor as team leader.
2. Give examples of positive and negative reinforcement.
3. Describe how positive reinforcement and encouragement can be used to improve productivity.
4. Explain why relying too heavily on negative reinforcement is usually ineffective.
5. Describe strategies for dealing with problem employees.
6. Describe appropriate disciplinary action.
7. Describe the importance of documentation and records related to employee supervision.
8. Describe confidentiality requirements of supervision.
9. Describe the basic leadership styles:
 - a) authoritarian
 - b) participative (democratic)
 - c) delegative (laissez faire)
10. Identify the personal leadership style used by yourself and others.
11. Give examples of how a leadership style can be appropriate or inappropriate depending on the situation.
12. Describe how different leadership styles can conflict with, or complement each other.
13. Describe strategies for dealing with different styles.
14. Describe the stages of team development.
15. Describe the effect of change (new crew members, etc.) on the stages of team development.
16. Model desirable behaviour with crew.

B. Communication.....6 Hours

Outcome: Practice effective communication on and off the drilling rig.

1. In the role of derrickhand or drilling contractor's representative, demonstrate appropriate communication with:
 - a) supervisors
 - b) equals
 - c) juniors
 - d) sub contractors
 - e) individuals representing the client – lease holder
 - f) other people on and off the rig
2. Demonstrate effective listening.

3. Demonstrate how feedback can make communication more effective:
 - a) ask questions
 - b) clarify (paraphrase)
 - c) identify communication error-failure
4. Identify barriers to communication:
 - a) poor or incorrectly interpreted written communication
 - b) verbal styles that can conflict with receiving verbal communication
 - c) non verbal communication conflicting with verbal communication
 - d) describe and identify 'noise' and 'interference' as it applies to communication with others
5. Demonstrate techniques for dealing with difficult situations and/or difficult people.
6. Be able to maintain records such as the required daily logs for drilling fluids.

C. Safe Practice and Safety Supervision 3 Hours

Outcome: Describe the role of the derrickhand in the responsibility for workplace safety.

1. Assist driller in conducting JSA, safety meetings, ensuring crew works safely at all times.
2. Ensure that any crew personal protection equipment is in good condition, if in use and that workers are using it properly.
3. Train workers in safe procedure and the use of personal protective equipment.
4. Use and maintains belts and lanyards, fall protection.
5. Secure self, tools and equipment when working at heights.
6. Model safe practice, including drug and alcohol policies.

D. Response to Rig Injuries 16 Hours

Outcome: Describe the typical injuries that can occur on a rig and how to provide emergency treatment for each injury type.

1. Describe typical rig injury types:
 - a) pinching, breaks, cuts, severed digits, etc.
 - b) rig fall related injuries
 - c) rig soft tissue injuries
 - d) rig contact burns, chemical burns
 - e) rig hazardous gas inhalation
 - f) vehicular accidents in remote areas
 - g) frost bite and hypothermia
2. Demonstrate the treatment of pinching injuries, breaks, cuts, severed digits, etc.
3. Demonstrate emergency treatment for fall related injuries.
4. Demonstrate emergency treatment for soft tissue injuries that occur on the rig.
5. Demonstrate emergency treatment for contact burns, chemical burns.
6. Demonstrate first response treatment for hazardous gas inhalation.
7. Describe the emergency treatment for vehicular accidents in remote locations.
8. Describe reporting accident procedures or emergency actions for accidents that occur off the rig site.
9. Demonstrate first response treatment for frost bite and hypothermia.

SECTION TWO:.....DRILLING FLUIDS 47 HOURS**A. Geology and Lithology 3 Hours**

Outcome: *Basic understanding of Canadian Sedimentary Basin (CSB) as it relates to oil and gas well drilling.*

1. Describe the drilling characteristics of the rock types common to the CSB:
 - a) limestones
 - b) sandstones
 - c) dolomites
 - d) shales
 - e) coal seams
2. Describe the distribution of hydrocarbons in the CSB.
3. Describe hydrostatic and formation pressures as found in the CSB.
4. Describe the effect of hydrostatic pressure on drilling.
5. Describe the effect of formation pressures on drilling.
6. Describe how drilling fluid is mixed and adjusted for different rock types and pressures.

B. Mud..... 16 Hours

Outcome: *Be able mix drilling fluids and alter the properties, such as Ph, viscosity, density, etc.*

1. Explain in terms applicable to the drilling fluids, the following:
 - a) acid
 - b) base
 - c) Ph
 - d) emulsions
 - e) solutions
 - f) mixtures
 - g) compounds
 - h) viscosifiers
 - i) thinners
 - j) flocculants
 - k) filtrates
 - l) water loss
 - m) combustibles
 - n) static discharges in fluid system
 - o) other
2. Using MSDS and supplier information explain the proper and safe procedure for mixing chemicals such as adding bases or acids to water, etc.
3. Explain the potential consequences of improper mixing procedures, or combinations of chemicals.
4. Describe the typical make up of drilling fluids and precautions for handling and mixing.
5. Using MSDS and or supplier information, describe the typical personal protective equipment used for mixing the ingredients of drilling fluids.
6. Describe basic first aid procedures for dealing with accidental exposure to harmful chemicals in mud mixtures.

7. Perform the following calculations or measurements for mud - drilling fluids:
 - a) density
 - b) viscosity
 - c) circulation time
 - d) timing the mix ratio
 - e) pit volume
 - f) returns from shaker
 - g) pump volume \ displacement
8. Monitor mud and chemical inventory.
9. Describe mud characteristics and applications of various mud treatments:
 - a) no chemical
 - b) chemically treated
 - c) organically treated
 - d) calcium treated
 - e) gyp muds
 - f) low solids muds
 - g) oil base muds/crude oil additives
10. Describe the effect and corrections for various mud contaminants on the drilling process:
 - a) drill solids
 - b) abrasives (sand, etc.)
 - c) cement
 - d) gypsum
 - e) salt rock or water
11. Describe how pressure variations are controlled by the mud system.
12. Describe corrosion problems and how to correct with additives.
13. Describe air drilling and common additives (ref. IRPs for under balanced drilling):
 - a) soaps
 - b) anti corrosives
14. Describe the hazards associated with air drilling, working with high pressure air, compressors, etc.
15. Describe drilling problems that can be indicated by the cuttings.
16. Describe the following problems and their correction:
 - a) foaming
 - b) fluid loss
 - c) high viscosity
 - d) slow drilling rate
 - e) high temperatures
 - f) cone bearing failure
 - g) bit balling
 - h) bentonitic swelling
 - i) running, sloughing, etc.
 - j) plastic salt
 - k) increase or decreased fluid returns
17. Describe the importance of maintaining proper pit level.

C. Pumps 10 Hours

Outcome: *Be able to describe the operation and maintenance of the mud pump system.*

1. Describe a mud pump system:
 - a) pressures
 - b) priming
 - c) duplex pumps
 - d) triplex pumps
 - e) pressure ratings for duplex vs. triplex pumps
 - f) strokes per minute (SPM)
2. Describe how a duplex pump is prepared for use.
3. Describe how a triplex pump is prepared for use.
4. Describe the need for positive load for triplex vs. duplex pumps.
5. Identify pump knock and isolate the cause:
 - a) mechanical knock
 - b) fluid knock
6. Describe the effect of contaminants such as sand, gas, air, CO₂, high temperatures, etc. on pump operation and component wear.
7. Describe the relationship between pump size, liner size pressure and the circulation rate.
8. Describe safe operation and pump lockouts.
9. Describe pump maintenance and lubrication schedule.
10. Describe the following fluid end maintenance procedures:
 - a) packing replacement
 - b) changing, heads, liners, valves, seats, rods
 - c) rod lubrication
 - d) liner wash
11. Describe the following power end maintenance procedures:
 - a) checking oil
 - b) maintain – replace pony rod seals, suction filters, oil change

D. High Pressure Mud Lines, Hoses, and Connections..... 8 Hours

Outcome: *Describe pressure ratings, handling and hook up of pipes hoses and connections used for the mud system.*

1. Describe the characteristics of high pressure pipe, lines and hoses.
2. Describe the need for maintaining the correct pressure rating for installed fittings.
3. Describe how to identify the pressure rating of fittings, connections and hammer unions.

4. Identify the proper application of fittings by type, including when and where they should be used:
 - a) elbows
 - b) tees
 - c) bull plug
 - d) unions
 - e) gate valve
 - f) globe valve
 - g) ball valve
 - h) plug valve
5. Identify pipe types/grades/schedules common to the oilfield.
6. Identify pressure rating and fire retardant rating for hoses and the appropriate application on the rig for different hose types.
7. Cut NPT pipe threads using manual threading dies and powered thread and pipe cutting equipment on 1-2" pipe.
8. Select appropriate thread dope or sealant for pressure rating of fitting.
9. Identify, select and connect correctly rated high pressure fittings and pipes.
10. Identify high pressure flange types including correct rings, gaskets, sealant, and fasteners to make the connection:
 - a) for drilling fluids
 - b) for air drilling
11. Identify pressure ratings and applications for safety valves, (pop valves):
 - a) color code rating for safety valves
 - b) color code rating for valve pins
 - c) other valve pressure rating systems
12. Describe valve settings procedure for mud system (e.g. open before closing to prevent excess pressure buildups).
13. Describe the hazards associated with high pressures, including:
 - a) leak detection, prevention
 - b) pump lock out procedures
 - c) routine inspection during operations
 - d) inspections during rig up rig down
 - e) indicators of problems (pressure variation, leaks, bulge in kicker hose, etc.)
 - f) safety lines and clamps used for securing high pressure hoses
 - g) safe handling of pressure equipment

E. Mud Tank and Low Pressure System 6 Hours

Outcome: Describe the operation and maintenance of the mud tanks and pits.

1. Describe safety requirements for working with mud tanks and pits, including:
 - a) entry
 - b) lockouts
 - c) personal protection equipment (PPEs)

2. Describe low pressure mud pumps and their applications:
 - a) centrifugal pumps
 - b) impeller sizing
 - c) thrash pumps
 - d) cellar/flyte pumps
3. Describe low pressure pump maintenance requirements.
4. Describe safety considerations for working on low pressure pumps, including:
 - a) working in the cellar
 - b) electrical safety
5. Describe the operation of shale shaker, including:
 - a) screen types
 - b) applications for screen types
6. Describe shale shaker and screen maintenance requirements.
7. Describe operation and maintenance of degassers.
8. Describe mixing hopper maintenance.
9. Describe solids control equipment including:
 - a) centrifuges
 - b) desanders
 - c) skimmers, etc.
10. Describe the operation and maintenance requirements for solids control equipment.
11. Describe the inspection and repair procedures for low pressure hoses and connections.
12. Describe the operation and maintenance of centrifuge.

F. Casing 1 Hour

Outcome: *Provide a brief overview of casing a well with emphasis on the role of the derrickhand.*

1. Describe the roles of derrickhand, drilling crew and specialist sub contractors for casing operations.

G. Waste Management and Spill Response 3 Hours

Outcome: *Describe the applicable environmental protection requirements for the disposal and/or recycling of waste materials associated with drilling rigs.*

1. Describe what is meant by hazardous wastes as defined by environmental regulations.
2. Describe the importance of using environmentally sound practices and procedures.
3. Describe EUB requirements for oilfield waste management.
4. Describe initial spill containment procedures.

SECTION THREE: FIRST LINE BLOWOUT PREVENTION..... 30 HOURS

(Note: First line BOP training and certification is required for all drillers, training and certification has been developed by PITS and approved by the EUB, the following is based on the PITS training, certification is issued based on passing an examination maintained by PITS, instructors will need to be PITS certified.)

A. First Line Blowout Prevention 30 Hours

Outcome: Be able to obtain first line BOP certification.

1. Describe government well control regulations.
2. Describe the source and magnitude of pressures.
3. Describe the warning signs of a kick.
4. Describe how a kick is managed, including:
 - a) crew positions and duties
 - b) circulating out influxes
 - c) shut in procedures

SECTION FOUR: DERRICK 12 HOURS**A. Derrick Equipment 3 Hours**

Outcome: Describe rigging up, operation and rigging down of the derrick and related equipment including maintenance requirements.

1. Describe derrick inspection and maintenance including:
 - a) crown sheaves
 - b) crown bumper blocks
 - c) traveling blocks
 - d) safety lines, ropes
 - e) derrick bolts and pins
 - f) torque tube (top drives)
 - g) welds
 - h) lines and equipment
 - i) platforms
 - j) hoists
 - k) fingers
 - l) stabbing boards
2. Describe CPSC IRP (Industry Recommended Practices) for overhead equipment and maintenance.
3. Describe how certain operations will affect derrick condition, maintenance and need for inspection:
 - a) drilling
 - b) jarring
 - c) moves

B. Derrick Safety 2 Hours**Outcome:** *Will work safely on the derrick.*

1. Describe the considerations for working with heights:
 - a) securing tools and equipment
 - b) personal protection equipment
 - c) belts, lanyards, fall protection

C. Rig Up and Rig Down 2 Hours**Outcome:** *Will be able to describe a rig move from the perspective of the derrickhand as second in command on the rig.*

1. Describe the role of the derrickhand on rig moves.
2. Describe the process and the roles of crew members for rig move.
3. Describe how buildings and equipment are picked up, transported and spotted.
4. Describe how to use the CAODC rig move manual as a reference during rig moves.

D. Tripping 5 Hours**Outcome:** *Will be able to completely describe the role of the derrickhand when tripping.*

1. Describe preparation for tripping:
 - a) safety inspection
 - b) fall arrest procedure
 - c) mud tank preparation
 - d) trip tanks
 - e) hole fill
 - f) drain equipment
 - g) prepare kelly, shakers, hoses, etc.
2. Describe equipment readiness check and safety inspection.
3. Describe procedure for mixing and pumping a pill.
4. Describe cold weather preparation for tripping.
5. Describe hand signals or other communication method between hands on derrick and driller.
6. List considerations for latching and unlatching elevators on tall pipe stands.
7. Describe the proper procedure for racking, storing, selecting and running drill pipe and collars, watching for snags, lanyard and rope condition, knots.

**THIRD PERIOD TECHNICAL TRAINING
RIG TECHNICIAN TRADE
COURSE OUTLINE**

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... LEADERSHIP AND COMMUNICATION 14 HOURS

A. Written Reports and Forms..... 3 Hours

Outcome: Be able to complete and keep track of the correspondence, forms and reports related to operating a drilling rig.

1. Explain the purpose of the tour sheet:
 - a) list what is an appropriate entry for a tour sheet
 - b) give examples of inappropriate entries for a tour sheet
 - c) complete a standardized tour sheet
2. Complete hole and fill sheets.
3. Describe the importance of an accurate pipe tally.
4. Inspect motor's log for completeness and accuracy.
5. Describe how a work permit should be written using a standard form, including the appropriate content for a work permit.
6. Write a work permit that clearly defines the limits of the permit.
7. Describe standard forms of business communication applicable to the rig, and the appropriate application for each type.
8. Describe email and fax formatting, including appropriate use of email, email content, email etiquette, etc.
9. Describe the disposition of internal bulletins and memos (eg filing, posting, etc.).
10. Describe report writing for the oil company, including the following reports:
 - a) incident
 - b) operation
 - c) technical details
11. Describe the importance of timely completion of reports, such as safety or environmental reports.
12. Using a word processor, compose a typical report of approximately 500 words.

B. Managing People 11 Hours

Outcome: Describe the responsibilities, and be able to act as an effective crew leader for the drilling rig.

1. Describe orientation of new crew members:
 - a) new hand
 - b) experienced hand, new to crew
2. Assess worker competency; prescribe and arrange for training if required.

3. Describe how to conduct an effective meeting with crew members (e.g. drilling plan, safety meetings), including:
 - a) gaining respect by showing respect
 - b) leading by example
 - c) addressing communication problems or potential problems
 - d) ensuring full meeting participation from the crew
4. Describe how to go through the drilling plan with the crew.
5. Describe the use of questions and feedback can assist in assessing worker competency.
6. Communicate expectations clearly.
7. Conduct or lead required drills.
8. Describe 'succession', how to prepare selected crew members for leadership positions.
9. When a driller is acting rig manager, describe the communication issues that may be faced with:
 - a) operator representatives
 - b) subcontractors
 - c) service providers
 - d) others on the rig who are not part of the rig crew

SECTION TWO: RIG MANAGEMENT AND SAFETY 42 HOURS

A. Safety Management 4 Hours

Outcome: *Describe the roles and responsibilities of the driller for the overall safety of the rig.*

1. Organize scheduled safety meetings.
2. Assess individual crew safety and well control training needs.
3. Observe crew readiness.
4. Perform PPE and clothing checks for crew and other personnel working on the rig.
5. Ensure that crew training is up to date, including certificate expiry dates.
6. Train or delegate training for crew members who need safety or equipment training.
7. Conduct safety drills including:
 - a) BOP
 - b) derrick rescue
 - c) SCBA
 - d) evacuation
 - e) man down
 - f) fire
 - g) spill response
8. Model ideal behaviour for the crew.
9. Describe procedures for ensuring that safety standards are met by all crew members.
10. Describe the meaning of 'due diligence'.
11. Describe the OH&S regulations for the legal responsibilities of the crew leader for crew safety at work.

B. Second Line Well Control30 Hours**Outcome** *Be fully prepared for Second Line BOP certification theory component.*

1. For Western Canada, locate geological areas by the characteristics of the types of gas and pressures encountered in drilling.
2. Describe initial rig up of manifolds, flare lines, degassers, diverters and choke lines.
3. Describe consideration for slinging and rigging BOP components.
4. Describe the constructions and selection of the appropriate high pressure gaskets.
5. Describe how flange construction, bolt placement and proper bolt torque relates to fitting pressure ratings.
6. Describe pressure testing manifold and blind rams.
7. Describe well shut in procedure.
8. Train crew in well control equipment and procedures.

C. Incident Investigation and Loss Control8 Hours**Outcome:** *Using case studies conduct a systematic incident investigation that will be an effective tool for prevention of similar incidents in the future.*

1. Define loss control.
2. Describe the purpose of loss control (prevention of future incidents, not assigning blame).
3. Using one or more case studies, perform the following tasks:
 - a) describe action required to respond to the emergency promptly and positively
 - b) describe how to take control at the scene
 - c) describe appropriate first aid and calls for emergency services
 - d) describe how to control potential secondary accidents
 - e) identify sources of evidence at the scene
 - f) preserve evidence from alteration or removal
 - g) investigate to determine loss potential
 - h) collect pertinent information
 - i) get "the big picture" first
 - j) describe why witnesses should be interviewed separately
 - k) describe why Interviews should be done on-site whenever feasible
 - l) describe how to put the person at ease
 - m) describe how to get the individual's version
 - n) describe how to ask questions at the right time
4. Describe how feedback is used for understanding.
5. Record critical information quickly in writing.
6. Use visual aids, including photographs, to describe an incident.
7. Describe basic rules for composing a photograph:
 - a) filling the frame
 - b) shooting angles
 - c) lighting
 - d) avoiding obstructions
 - e) showing required details
8. Use re-enactment sparingly and carefully.
9. Describe how to end on a positive note.

10. Describe how communication lines are kept open.
11. Analyze and evaluates all significant causes.
12. Use cause and effect to determine how the incident occurred, including:
 - a) make a causal factor outline
 - b) immediate causes or symptoms (substandard acts and conditions)
 - c) basic or underlying causes (personal factors and job factors)
 - d) determine the critical causes
 - e) deficiencies in the management system (inadequate program, inadequate standards, inadequate compliance with standards)
13. Document using written reports.
14. Develop remedial actions.
15. Consider alternative controls.
16. Describe how to decrease the likelihood of occurrence.
17. Describe how to reduce the potential severity of loss.
18. Describe immediate temporary actions.
19. Describe permanent actions to take as soon as possible.
20. Describe consultation with superiors as required, describe when to ask.

SECTION THREE:RIG OPERATIONS 34 HOURS

A. Rig Boilers 16 Hours

Outcome: Be able to obtain ABSA rig boiler certification.

1. Describe ABSA regulations for rig boiler operation and certification:
 - a) identify components
 - b) describe operation
 - c) describe field maintenance
 - d) describe troubleshooting

B. Console 8 Hours

Outcome: Be able to describe the purpose and function of the controls and instruments of standard drilling console types.

1. Describe the instruments and controls of the typical console.
2. Describe the instruments, interpret what they are indicating:
 - a) weight indicator
 - b) pressure indicators (air, water, hydraulic)
 - c) transmission
 - d) brake
 - e) clutch
 - f) torque gage
 - g) rotary rpm gage
 - h) temperature gages
 - i) ammeter
 - j) electronic controls
3. Describe brake operation.

4. Describe typical top drive console.
5. Describe crown saver operation.
6. Describe the relationship between torque, gearing and drilling speed.
7. Describe proper application of the clutch and transmission.

C. Drilling Calculations6 Hours

Outcome: Be able to perform drilling calculations and describe their purpose.

1. Describe the importance of an accurate pipe tally; give examples of problems caused by errors.
2. Calculate pump volume, displacement, pump and liner ratings.
3. Calculate mega joules for slip and cut.
4. Calculate maximum weight on bit.
5. Calculate hole volume.
6. Calculate casing cement displacement.

D. Drawworks2 Hours

Outcome: Provide a detailed description of the operation and maintenance of the drawworks.

1. Be able to evaluate condition of the drawworks, including:
 - a) brakes (eaton, band, hydromatic, regenerative, etc.)
 - b) brake linkages
 - c) auxiliary brakes
 - d) brake cooling
 - e) sprockets
 - f) bearings
 - g) chains
 - h) crown savers
 - i) lubrication
 - j) compound and power
 - k) clutches (water, electric, friction)
 - l) crown saver
2. Describe drawworks rating and the relationship of the ratings of all rig components to the overall rating of the rig.
3. Describe drawworks maintenance and troubleshooting.

E. Managing Rig Moves2 Hours

Outcome: Describe managing a rig move efficiently.

1. Describe the role of the driller in rig moves.
2. Describe the purpose and content of the Rig Move Manual.
3. Describe the chain of command for rig moves:
 - a) who is in charge at each stage
 - b) who should be giving orders to whom
4. Describe the hazards associated with rig moves and how to address them (e.g. pre-job meeting).
5. Describe importance of ensuring the crew is ready when needed at each stage of the move.
6. Describe the importance of electrical grounding as it applies to drilling rigs and equipment.

7. Describe checking drilling line.
8. Describe visual inspection of the derrick and other structural components for signs of structural damage or failure (e.g. flaking paint indicates possible weld failure).
9. Describe pick up and placement of components – buildings, weight and handling issues, use of rig diagram.
10. Describe importance of first mat placement or drilling of rat hole.

SECTION FOUR: DRILLING OPERATIONS..... 30 HOURS

A. Operating Floor Equipment 5 Hours

Outcome: Provide a detailed description of the equipment used for drilling the main hole.

1. Describe the operation, inspection, rating and maintenance of:
 - a) manual slips
 - b) tongs – dies
 - c) elevators
 - d) other tubular handling tools
 - e) automatic pipe handling tools
 - f) drill string hoisting equipment
 - g) rotating equipment
 - h) slick line equipment
 - i) chocks and lo-torque valves
 - j) wash down equipment
 - k) dog collars, etc.
 - l) rigging, checking lines
2. Describe testing and certification requirements for overhead equipment:
 - a) inspection schedules
 - b) tracking hours
 - c) magnafluxing – non destructive testing
3. Describe slip and cut procedure.
4. Describe operation of:
 - a) pneumatic equipment
 - b) hydraulic equipment
 - c) electric equipment
5. Describe how control systems work.
6. Describe the purpose of planned preventative maintenance.

B. Drilling Tools 4 Hours**Outcome: Describe the specialty drilling tools and their application.**

1. Describe special drilling tools (including those supplied by others):
 - a) mud motors
 - b) bumper subs
 - c) reamers
 - d) stabilizers
 - e) hole openers
 - f) whip stock
 - g) shock subs
 - h) mechanical and hydraulic drilling jars
 - i) fishing tools
2. Describe drilling tool assembly.
3. Describe drill bit types:
 - a) roller
 - b) drag
 - c) diamond
 - d) PDC
4. Describe drill bit optimization.

C. Tubulars 8 Hours**Outcome: Provide a detailed description on the deployment, care and handling of tubulars.**

1. Describe pipe inspection and downgrading.
2. List and describe pipe down grading factors:
 - a) torsion rating
 - b) tensile rating
 - c) load limit
3. Describe thread types and characteristics of thread types.
4. Describe proper handling and the effect of improper handling on pipe characteristics.
5. Describe how to break in new pipe.
6. Describe visual inspection of pipe for damage.
7. Describe the effects of improper pipe handling.
8. Describe the effects of tool condition, hard banding, galling, etc.
9. Describe using supplier provided inspection manuals.

D. Drilling 10 Hours**Outcome: Provide a detailed description of the drilling process.**

1. Describe the operation of the well survey tools in common use:
 - a) wireline
 - b) teledrift
 - c) NWD
 - d) signal shot
2. Describe how the main hole is surveyed for deviation.

3. Describe methods to correct for deviations.
4. Describe fishing operations.
5. Describe how a leak off test is done.
6. Describe washouts and how to deal with them.
7. Describe the importance of keeping trip tank full.
8. Describe the equipment and procedures for conducting the Drill Stem Test (DST).
9. Describe tight hole problems, including:
 - a) differential sticking
 - b) sloughing shale
 - c) doglegs
 - d) coal seams, gravel, boulders
10. Describe loss of circulation, including:
 - a) effects of circulation loss
 - b) combating circulation loss

E. Casing 3 Hours

Outcome: Provide detailed description of the procedures, materials and equipment used for casing the well.

1. Describe how casing is matched to well control equipment.
2. Describe the differences between casing and tubulars:
 - a) slips and elevators
 - b) connections
 - c) torque values
 - d) circulating casing
 - e) power tongs and stabbing board
3. Describe the various characteristics of casing cement:
 - a) density (weight)
 - b) tensile strength
 - c) circulating time vs. hardening time
4. Describe tying down casing.



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